

Control Valve

Abstract

A fluid power apparatus having a housing with a bore therein that is divided by a power piston into an inlet chamber and an outlet chamber. The power piston has a passageway for connecting the inlet chamber with an outlet chamber through an orifice and a valve arrangement therein to control the flow of a fluid under pressure from a source through the orifice. The valve arrangement including a valve seal, a valve spring and an input rod. The valve spring urges the valve seal into engagement with the input rod to define a working chamber within the passageway that is connected to the inlet chamber. Fluid under pressure flows from the working chamber to the outlet chamber by passing between the valve seal and a valve seat to the orifice. The flowing of fluid through the orifice develops a turbulence that creates a broad band non-reaction sound having an acceptable audible level that is acceptable at rest mode of operation. In an actuation mode of operation, the input rod responds to an actuation force from an operator by moving the valve seal toward the valve seat to restrict the flow of fluid from the working chamber. The restriction in the

flow of fluid causes a corresponding fluid pressure change of the fluid in the inlet chamber that acts on the power piston to create an output force. However, the restriction in the flow of fluid from the working chamber also creates a second turbulence in the fluid that is communicated to the outlet chamber. The valve is characterized by an annular ring that extends from the seal and into the passageway to divert the flow of fluid having the second turbulence away from the return spring and thereby attenuate the development of reaction in the return spring that would create a noise that exceeds an acceptable audible range.